



DEPARTMENT OF THE ARMY RESERVES

89<sup>th</sup> Regional Readiness Command



Final

**Remedial Design/Remedial Action  
Work Plan for the Final Remedial Action for the  
Groundwater Operable Unit**

FORMER WELDON SPRING ORDNANCE WORKS

WELDON SPRING, MISSOURI

OPERABLE UNIT 2: GROUNDWATER

Prepared by: US Army Corps of Engineers, Kansas City District  
Prepared for: 89<sup>th</sup> Regional Readiness Command

**Phase II – Institutional Controls**

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### NOTATION

The following is a list of the acronyms and abbreviations used in this document

### *ACRONYMS AND ABBREVIATIONS*

#### *General*

AR	Army Regulation
ARARs	Applicable or Relevant and Appropriate Requirements
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CPA	Chemical Plant Area
CSR	Code of State Regulations (specifically, Missouri)
DA	U.S. Department of Army
DOD	U.S. Department of Defense
DOE	U.S. Department of Energy
EPA	U.S. Environmental Protection Agency
FFA	Federal Facilities Agreement
GIS	Geographic Information System
GSRAD	Geological Survey & Research Assessment Division
IAW	In accordance with
ICs	Institutional Controls
MDC	Missouri Department of Conservation
MDNR	Missouri Department of Natural Resources
MNA	monitored natural attenuation
µg/L	micrograms per liter
NCP	National (Oil and Hazardous Substances Pollution) Contingency Plan
OU1	Operable Unit 1: Soils and Process Pipelines
OU2	Operable Unit 2: Groundwater
RAO	remedial action objective
RD/RA	Remedial Design / Remedial Action
RG	Remediation Goal
ROD	Record of Decision
UECA	Uniform Environmental Covenants Act
WSOW	Weldon Spring Ordnance Works
WSTA	Weldon Spring Training Area
WSSRAP	Weldon Spring Site Remedial Action Project

#### *Chemicals*

1,3-DNB	1,3-dinitrobenzene
2,4-DNT	2,4-dinitrotoluene
2,6-DNT	2,6-dinitrotoluene
DNT	dinitrotoluene (refers to both 2,4-DNT and 2,6-DNT)
NB	nitrobenzene
NT	nitrotoluenes (refers to 2-NT, 3-NT, and 4-NT)
TNT	2,4,6-trinitrotoluene

## 1 INTRODUCTION

Operable Unit 2 (OU2) is the second of two operable units established for the Former Weldon Spring Ordnance Works (WSOW). The first operable unit, OU1, addressed contaminated soil and pipeline at the WSOW. OU2 addresses contaminated groundwater and springs in the WSOW. The selected remedy for the groundwater and springs at the WSOW constitutes the final component of the phased cleanup process implemented at the WSOW.

### 1.1 PURPOSE AND SCOPE

This is Phase II of the *Remedial Design/Remedial Action Work Plan* of the intended to fulfill the requirements for both the remedial design and the remedial action work plans for the implementation of the *Record of Decision for the Final Remedial Action for Operable Unit 2, Groundwater, at the Former Weldon Spring Ordnance Works* (ROD). Phase I was developed to cover the performance monitoring strategy for the selected remedy, Monitored Natural Attenuation (MNA). Phase II (hereafter referred to as *Work Plan*) covers the design and implementation of Institutional Controls (ICs) for OU2. This *Work Plan* provides the following:

- The design strategy for the Institutional Controls,
- The implementation approach for this activity, and
- A proposed general schedule under which the remedial design and remedial action activities are projected to be conducted.

### 1.2 BACKGROUND

The ROD presents the selected final remedial action for OU2 which was selected following the requirements of CERCLA. The selected remedy for OU2, monitored natural attenuation (MNA), also includes institutional controls (ICs) to aid in ensuring that use of the groundwater and springwater is restricted as appropriate during the restoration period. A Phase I *Remedial Design and Remedial Action Work Plan* has been developed to provide the design for performance monitoring and performance goals of the selected remedy. Phase II presents information related to ICs.

ICs will remain until ARARs or health based remediation goals are met (Table 1-1) which is considered to be unrestricted use of groundwater at this site. Restoration of the aquifer is estimated to take 160 years. Information presented in the *Remedial Investigation, Feasibility Study, Baseline Risk Assessment, Groundwater Monitoring Assessment Report, Supplemental Feasibility Study, and Proposed Plan*, prepared for OU2 was used to develop the selected action. This information, the *Remedial Design/Remedial Action Work Plan – Phase I*, and specific research on ICs were used to develop the *Remedial Design/Remedial Action Work Plan – Phase II (RD/RA Work Plan Phase II)*.

### 1.3 DOCUMENT ORGANIZATION

The remaining sections of the document are:

- 2, Monitored Natural Attenuation: Summarizes Section 2 of the *RD/RA Work Plan – Phase I* to provide context for application of ICs at the Site.

- 3, Institutional Controls Design: Discusses the design criteria for developing the IC measures and the associated plan for implementation of the ICs that will be employed for OU2.
- 4, Project Schedule: Provides an update to the overall proposed schedule for the design and implementation of the different activities (includes both Phase I and Phase II).

**TABLE 1-1: Remediation Standards for the OU2 Groundwater of WSOW**

Contaminant of Concern	Standard (µg/L)	Basis of Standard
2,4-DNT	0.11	Missouri Water Quality Standards, 10 CSR 20-7.031
1,3-DNB	1.0	Missouri Water Quality Standards, 10 CSR 20-7.031
NB	17	Missouri Water Quality Standards, 10 CSR 20-7.031
2,6-DNT	1.3	Risk based concentration equivalent to $10^{-5}$ resident scenerio
2,4,6-TNT	2.8	Risk based concentration equivalent to $10^{-6}$ resident scenerio
o-NT	37	Risk based concentration based upon Hazard Index of 1 residential scenerio
m-NT	37	Risk based concentration based upon Hazard Index of 1 residential scenerio
p-NT	37	Risk based concentration based upon Hazard Index of 1 residential scenerio

\*The remedial goal for 2,6-DNT was selected on the basis of site specific factors, including technical limitations in achieving cleanup levels greater than a  $10^{-5}$  risk level.

## 2 MONITORED NATURAL ATTENUATION

The selected remedy provides for monitored natural attenuation (MNA). Institutional Controls (ICs) are included as an important component of the remedy to prevent access to groundwater while monitored natural attenuation occurs. This remedial action is being performed to comply with the *ROD*. The remedial action objective (RAO) is:

To minimize the potential for exposure either by ingestion, dermal contact, or inhalation of contaminated groundwater until concentrations are reduced to cleanup standards specified in the Table 2.8-1 in the *ROD* (Table 1-1 of this *Work Plan*).

The aquifer (shallow aquifer, Burlington-Keokuk) is not likely to be used as a drinking water source due to low aquifer yield and the availability of municipal drinking water sources in the area. Nevertheless, cleanup standards are based on ARARs and levels deemed to be protective for residential drinking water.

As stated in the *ROD*, the major components of the selected remedy include:

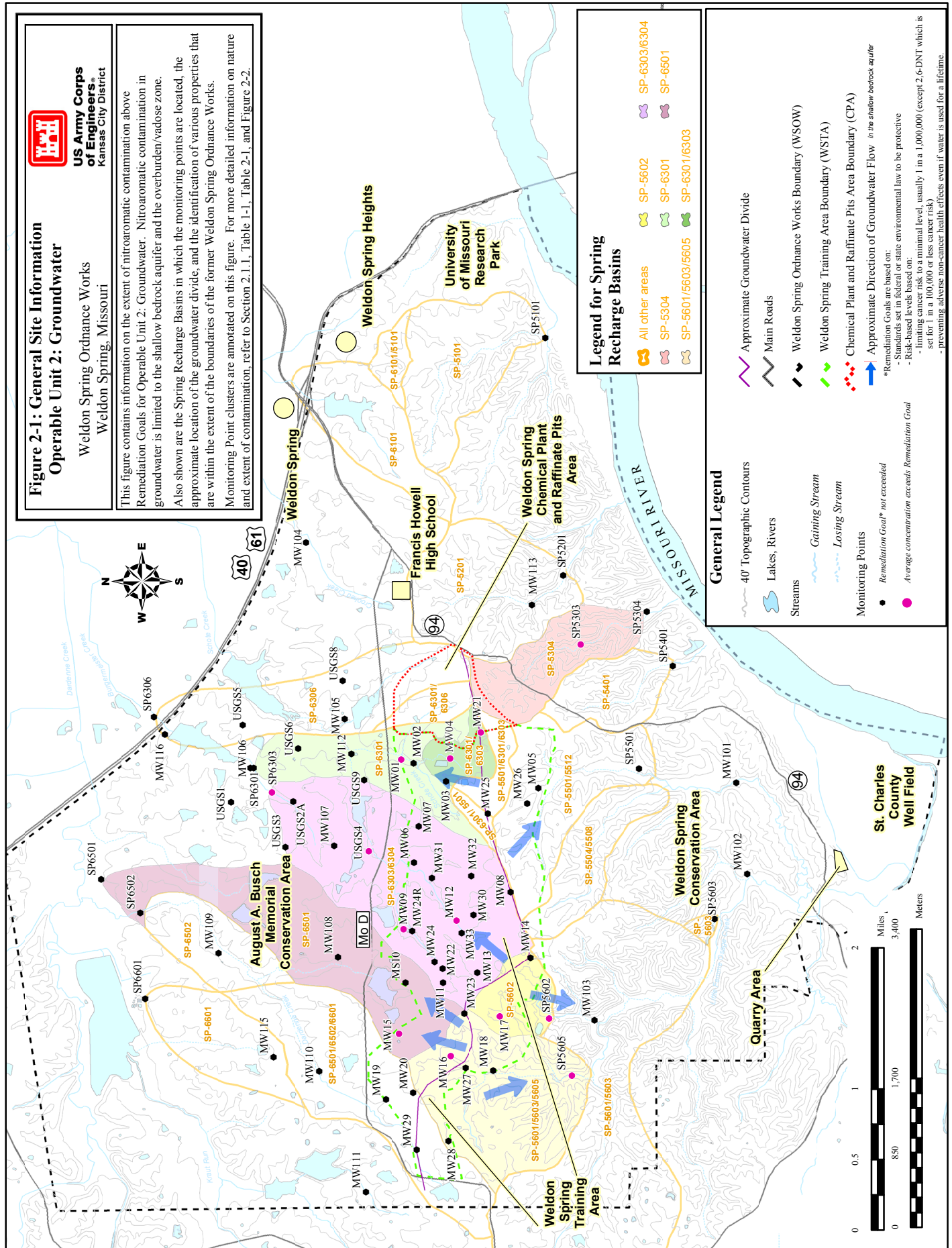
- Collection of monitoring data to verify the effectiveness of naturally occurring processes to reduce contaminant concentrations.
- Use of select wells from the existing groundwater monitoring network to collect groundwater data. Use of select springs at the site for additional monitoring data. The initial monitoring network will be presented during remedial design. This network will be modified over time, if necessary, to aid in evaluation of progress toward the RAO. This modification may include installation of new monitoring wells.
- Institutional controls in areas which exceed remediation goals designed to limit ingestion or dermal exposure to groundwater and prevent use of groundwater contaminated above ARARs or health based remediation goals as a potable water source. The institutional controls would also restrict activities that may negatively impact the remediation of contamination or result in creation of a potential for downward migration of contamination.

This phase of the RD/RA Work Plan, Phase II, addresses Institutional Controls.

### 2.1 NATURE AND EXTENT OF CONTAMINATION

Groundwater at the WSOW is contaminated with nitroaromatic compounds (Figure 2-1). Groundwater contamination originated from various sources that were reduced and/or eliminated as part of OU1. Surface water and precipitation mobilized nitroaromatic contamination into the uppermost water-bearing unit at the WSOW. Contamination is limited to the shallow bedrock aquifer (Burlington-Keokuk) and the springs at the WSOW. Contamination is neither impacting the deeper aquifer nor the sand and gravel alluvial aquifer of the Missouri River. The weathered Burlington-Keokuk Limestone is the uppermost unit within the shallow bedrock aquifer. An east-west trending groundwater divide results in two flow systems in the shallow aquifer beneath the WSOW. Contaminated groundwater has been observed north and south of this divide. To aid in developing a monitoring strategy, contaminated wells and springs have been evaluated based on impacted spring recharge basin areas (See Figure 2-1) as defined by the dye-trace study data collected by the Missouri Department of Natural Resources (MDNR) Division of Geology and Land Survey. The monitoring strategy has been developed considering the nature and extent of contamination and the performance goals identified in the *ROD*.





Of the 13 monitoring points at the WSOW (See Figure 2-1) with concentrations of nitroaromatics exceeding the Remediation Goals (RGs) provided in the Record of Decision, eight are located on the Weldon Spring Training Area (WSTA). Of the five other monitoring points with exceedances of RGs, two points are located north of the WSTA within the same spring recharge basin and are of the same order of magnitude as the RGs. These two points are located in the SP-6303/6304 spring recharge basin and are within the boundaries of the WSOW.

The remaining three monitoring points are located to the south and southeast of the WSTA (also within the boundaries of the WSOW). The monitoring points are springs located at a distance of 0.5 to 1.5 miles from the nearest road access across rugged terrain. Concentrations of nitroaromatics in these springs range from 1 to 2 orders of magnitude over the RGs. However, as the springs represent the only existing complete pathway for exposure to contaminated water, a recreational exposure scenario has been developed (Baseline Risk Assessment, DOE and DOD 1997) to identify the potential risk to current users of the conservation property near the impacted springs. The concentrations observed at the springs are lower than the concentrations established as protective under the recreational exposure scenario. However, to ensure that both current and potential future uses of the springs are protective, the RGs are based the residential exposure scenario and ARARs (refer to Appendix B for more information on Current and Future Land and Resource Use as described in the OU2 record of Decision).

Table 2-1 provides details on the specific monitoring points with mean concentrations exceeding RGs. For each monitoring point with an exceedance of RGs, there is at least one downgradient monitoring point within the WSOW that is at or below the RGs. In most cases, the most downgradient monitoring point within the boundaries of the WSOW is non-detect for all nitroaromatics.

Off-site migration occurs laterally through solution-enlarged conduits and bedding planes in the weathered Burlington-Keokuk Limestone. The expectation is that the concentration of contaminants will be reduced during transport as a result of dispersion along existing flow paths and become more dilute with natural recharge from precipitation and lateral flow. Adsorption of contaminants in the overburden and similar effects due to micropores and microfractures in the bedrock limit the rate of mass transfer from the overburden and bedrock system to the larger fractures and features responsible for the transmission of groundwater through the overburden and bedrock system. Physical destruction of nitroaromatics (biotic, abiotic, and photolytic processes) also serves to reduce the mass of contamination but is generally limited in effect when compared to the dominant processes of dilution and dispersion. Over time, concentrations in the areas of highest impact will decrease, but because of dispersion, concentrations in some downgradient locations may exhibit temporary increases.

The OU1 remediation effort significantly reduced and/or eliminated known sources of explosives contamination to groundwater. As a result, groundwater quality should continue to improve. Recent (May 2003 to July 2004) activities associated with the OU1 (specifically T-13, which is upgradient of monitoring well cluster 16) may result in temporary concentration increases in the downgradient sampling locations. However, the overall area of contamination should not become significantly larger than it currently is. The distribution of contaminants is controlled by the structure of the bedrock, which controls the groundwater flow direction in the shallow aquifer beneath the WSOW. Data collected to date provides support that the most downgradient monitoring points within the WSOW are non-detect for all nitroaromatics. This trend is not expected to change.

Groundwater at the WSOW has also been impacted by contamination sourced on the adjacent Chemical Plant Area (CPA) that is under management by the U.S. Department of Energy (DOE) as part of the Weldon Spring Site Remedial Action Project (WSSRAP). DOE will monitor for nitroaromatic compounds at locations on both the CPA and WSOW that are or could be impacted by migration from source areas that have been remediated at the CPA. The Army will address groundwater impact associated with previously impacted soils near Production Line #4, which is along the southeast boundary of the WSTA, adjacent to the CPA.

TABLE 2-1: Monitoring Points with Mean Concentrations Exceeding Remediation Standards for the OU2 Groundwater of WSOW

Area	Well ID	Analytical Parameter	Remediation Goal (µg/L)	Number of samples	Mean* (µg/L)
<b>SP-5304</b>	SP5303	2,4,6-TNT	2.8	6	21.20
<b>SP-5601/5603/5605</b>	MWS16	2,4,6-TNT	2.8	14	3.00
	SP5605	2,4,6-TNT	2.8	12	25.28
<b>SP-5602</b>	MWS17	2,4-DNT	0.11	14	0.13
	SP5602	2,4-DNT	0.11	13	0.18
		2,6-DNT	1.3	12	1.56
<b>SP-6301</b>	MWV01	2,4-DNT	0.11	5	0.21
<b>SP-6301/6303</b>	MWS04	2,4-DNT	0.11	13	0.19
	MWS21	2,4-DNT	0.11	13	0.23
<b>SP-6303/6304</b>	MWV09	2,4,6-TNT	2.8	14	24.49
		2,4-DNT	0.11	14	37.37
		2,6-DNT	1.3	13	4.39
	MWS12	2,4-DNT	0.11	13	79.85
		2,6-DNT	1.3	12	59.92
		1,3-DNB	1	12	2.98
		o-NT	37	13	280.39
		p-NT	37	12	143.17
	USGS4	2,4-DNT	0.11	14	0.12
		2,6-DNT	1.3	12	2.65
	SP6303	2,4-DNT	0.11	5	0.12
<b>SP-6501</b>	MWS15	2,4-DNT	0.11	14	0.28

\*Period of evaluation is Round 22 through Round 35 (October 1999 to August 2003)

### 3 LAND USE CONTROLS

Institutional control (IC) objectives, as outlined by the ROD include:

- Restrict activities that may negatively impact the remediation of contamination
- Restrict activities that may result in creation of a potential for downward migration of contamination
- Reduce the potential for ingestion or dermal exposure to groundwater contaminated at concentrations above remediation goals
- Prevent use of groundwater contaminated above ARARs or health-based remediation goals as a potable water source

These objectives are related to the OU2 Remedial Action Objectives (RAO):

- To minimized the potential for exposure either by ingestion, dermal contact, or inhalation of contaminated groundwater until concentrations are reduced to cleanup standards specified in Table 2.8-1 in the ROD (Table 1-1 of this *RD Work Plan*)

For the IC component of the selected remedy, controls and use restrictions that are appropriate with regard to land ownership and that are reasonably implementable, reliable, and enforceable were considered. The OU2 ICs will include a combination of different controls to address similar conditions for both federally and state owned property. ICs on WSTA will be implemented through federal agency land management mechanisms while the ICs on the state owned portion of the former WSOW will be implemented through state property, environmental, and construction laws. A map overview of the areas where ICs will be implemented is provided as Figure 3-1.

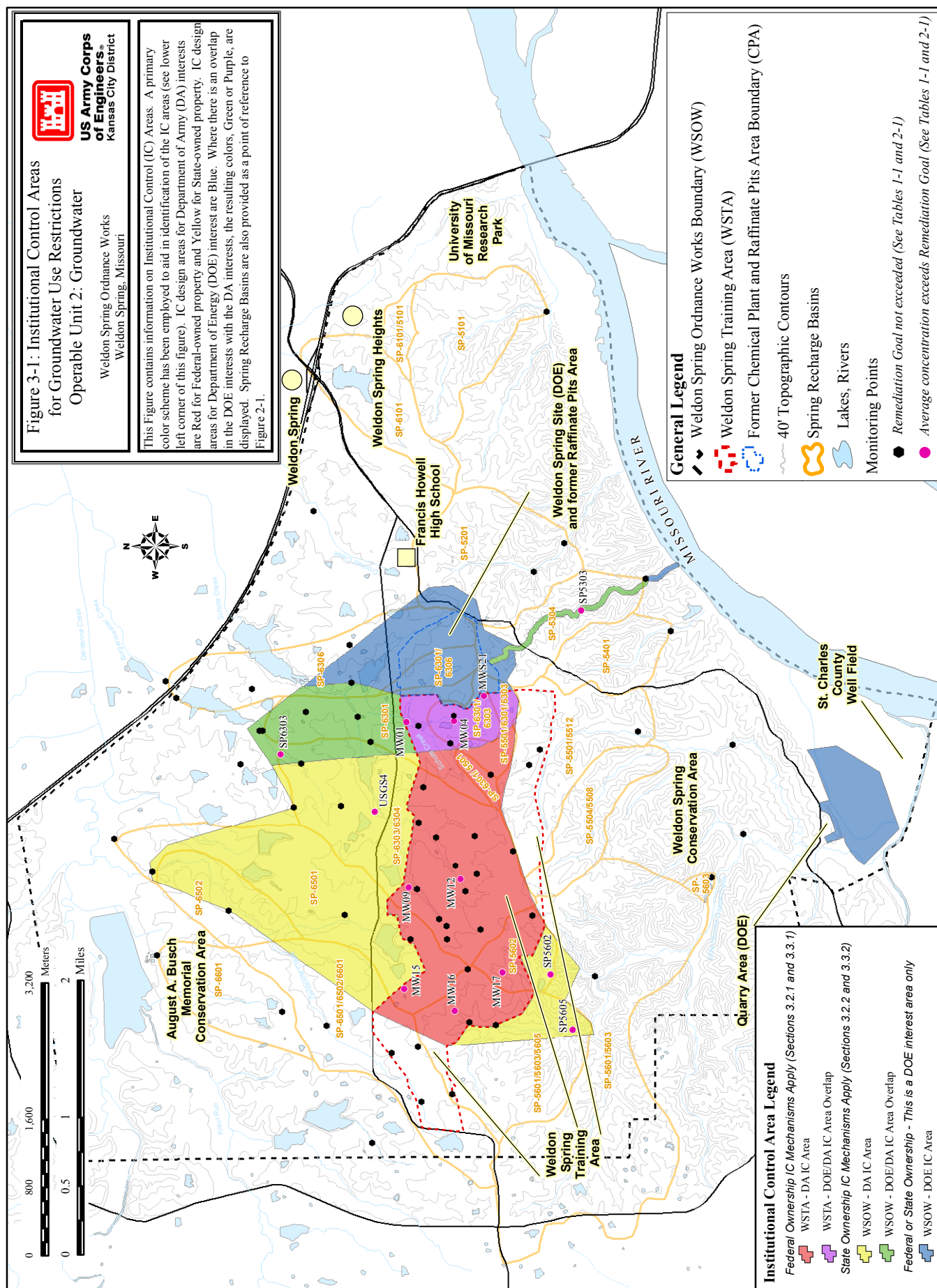
#### 3.1 SUMMARY OF PROPOSED INSTITUTIONAL CONTROLS

##### ***Federally Owned Property – WSTA:***

- Compliance with Federal, DOD and Department of Army Regulations (AR) associated with environmental planning and implementation of ICs (including AR 200-1, DA Pamphlet 200-1 and AR 210-20, making use of the Installation Master Plan as appropriate)
- Installation regulation or instruction with provisions consistent with the basic requirements of the Missouri Well Construction Code (10 CSR 23-3), including those for a designated special area in order restrict well construction or any groundwater access activities.
- Informational Devices – Pamphlet/ Notice with regard to the groundwater contamination at the WSTA and the associated use restrictions to be circulated on installation and in a public repository, and/or the DOE Weldon Spring Site Interpretive Center.
- Compliance with CERCLA 120(h) and DOD guidance for future transfers of property to state or private ownership.

***State-Owned Property*** (and property transferred out of Federal ownership in the future to State or private ownership) – ***former WSOW:***

- State enforcement of Missouri Well Construction Code (10 CSR 23-3) procedures and potential designation of the impacted state-owned property as a “sensitive area” under the Code provisions of 10 CSR 23-3-100.
- Implementation of a deed restrictive covenant in accordance with state property law and environmental law and relevant guidance.



Note: The Institutional Control (IC) areas depicted in this figure are considered draft until finalized as part of the actual mechanism providing the IC. Further, these areas are subject to revision at any time given (1) justification for the change, (2) appropriate coordination with the regulatory agencies as required by the Federal Facilities Agreement, (3) coordination with parties holding interest in the IC. Any proposed change must be consistent with the requirements of the OU2 ROD.



- Informational Devices – Pamphlet/ notice regarding groundwater contamination and associated use restrictions to be available in public repositories and the DOE Weldon Spring Site Interpretive Center.

Multiple layers of ICs will be sought in order to best meet the objectives of the ICs. No privately owned property is affected by the use restrictions, so IC coordination with private landowners is not required. However, coordination with the State and DOE will be needed to effectively implement the proposed ICs as both the Department of Army (DA) and DOE are pursuing ICs in some of the same areas of the state property. The Missouri Department of Conservation (MDC), the operating authority for this impacted state property (portions of the August A. Busch Memorial Conservation Area and Weldon Spring Conservation Area), has been contacted by both DA and DOE.

Figure 3-1 describes the DA IC areas, the DOE IC areas, and the overlap of the IC areas being pursued by both DOE and DA. One of the DOE IC areas associated with the WSSRAP extends from the former CPA to Burgermeister Spring (SP6301). One of the DA IC areas also extends to Burgermeister Spring and overlaps with this DOE area. The other area of overlap is associated with the Southeast Drainage area. In addition to the overlap on the state owned area, there is also an overlap on the eastern end of the WSTA. Both DA and DOE are pursuing ICs on this portion of the WSTA.

The ICs to be implemented on OU2 will integrate the remediation efforts and ICs implemented by DOE and DA as appropriate. Once coordination with MDC and DOE is completed, a description of the specific ICs for specific areas and the details for their final implementation will be provided to the US Environmental Protection Agency (EPA) and MDNR. Due to the fact that certain types of controls may require a longer development and/or implementation period, various layers of controls may be added at different times. Documentation of controls will be provided to EPA and MDNR.

The DA will implement, maintain, and enforce ICs on federally owned property controlled by the DA (WSTA). The implementation, maintenance, and enforcement of ICs on state owned property are addressed in the following subsections. On the state owned property and after any future transfer of current federal property, IC responsibility will be assumed in part by the property owner in accordance with deed restrictions, other agreements, and non-federal governmental controls. However, the DA will remain responsible to ensure that the IC objectives are maintained to ensure the integrity of the remedy. DA and regulators will consult to determine appropriate enforcement actions should there be a failure of an IC objective on the state owned property or a property transferred in the future.

### **3.2 AFFECTED AREAS**

The anticipated IC area covers properties under either Federal or State ownership and encompasses the WSTA, the August A. Busch Conservation Area and the Weldon Spring Conservation Area. The affected areas have been divided into DA property (WSTA) and portions of the remainder of the WSOW (Figure 2-1). The impacted groundwater areas of the WSOW beyond the boundaries of WSTA are owned and managed by the MDC. The current impacted area at the WSOW has been identified through extensive groundwater monitoring. These areas are described by the associated Spring Recharge Basin. SP-6303/6304, SP-5601/5603/5605, SP-5602, SP-5304, SP-6301/6303, and SP-6301 are the currently identified areas with monitoring points exceeding ARARs or health-based

standards. Currently, 13 monitoring points exceed the ROD remediation standards. Figure 3-1 shows the anticipated IC areas. A survey or similar means for describing the IC area will be completed as part of the implementation of ICs. This process will be used to establish specific boundary coordinates and/or a legal description for the IC area.

### **3.2.1 Weldon Spring Training Area**

The WSTA contains eight monitoring points which currently exceed ROD remediation standards. These are located in four different Spring Recharge Basins. The impacted basin adjacent to the former CPA is also impacted by contamination originating from the former CPA and is being addressed by DOE in coordination with the DA. See Table 2-1 for average concentrations, Figure 2-1 for location of these points, and Section 2.1 for additional information.

### **3.2.2 Weldon Spring Ordnance Works Outside of the Weldon Spring Training Area**

The WSOW area contains five monitoring points; two points are located north of the WSTA within the same Spring Recharge Basin and three points are located to the south of the WSTA in three separate Spring Recharge Basins. DOE-related contamination is also located in one of these Spring Recharge Basins (Southeast Drainage, SP-5304 Spring Recharge Basin). See Table 2-1 for average concentrations, Figure 2-1 for location of these points, and Section 2.1 for additional information.

### **3.2.3 Land Use Controls Overview by Area**

#### **3.2.3.1 Weldon Spring Training Area**

**Installation Master Plan and Construction Regulation:** The DA environmental and property management regulations provide a framework for the development and management of ICs as well as the procedure for assessment and modification of ICs during change in use or change in ownership (including transfer requirements of CERCLA 120(h)(3)). The requirements for these considerations are presented in Army Regulation (AR) and Army Pamphlet 200-1 (Environmental Quality – Environmental Protection and Enhancement) and Army Regulation 210-20 (Real Property Master Planning for Army Installations). AR 210-20 provides requirements for incorporation of land use controls, into the environmental overlay of the Installation Master Plan. This environmental overlay is then used to manage and approve all facility construction projects throughout the installation. This environmental overlay will also be provided to appropriate installation offices responsible for installation management and training. This RD/RA Work Plan (Phase I and Phase II) will be used to aid in development of groundwater use or well construction and use restrictions for incorporation into the environmental overlay of the WSTA Master Plan (or similar document). The environmental overlay (GIS based) will include information on areas with groundwater contamination and identify the nature of activities restricted and/or limited by the presence of groundwater contamination. The installation may also prepare a localized regulation or instruction to assist in establishing and maintaining ICs in coordination with various installation offices and commands. In addition to incorporating various implementation provisions, the master plan and local instruction may require lease restrictions whereby if the property with impacted groundwater is leased, equivalent ICs will be put into terms and conditions of the lease, which are no less restrictive than the IC objectives described above. Furthermore, the lessee will be responsible for ensuring that any sublessors comply with the ICs.

**Information:** An educational pamphlet or notice will be developed with regard to the groundwater contamination at the WSTA and the associated restrictions on use. This pamphlet or notice will be made available at the installation, the public repository, and/or the DOE Interpretive Center.

### 3.2.3.2 Former Weldon Spring Ordnance Works Outside of the Weldon Spring Training Area

**Groundwater Well Restrictions:** There are existing controls for restricting access to contaminated groundwater on state-owned property. The State of Missouri's Well Construction Code (10 CSR 23-3) restricts the minimum depth at which a well (10 CSR 23-3.100(4)(A)) can be installed and requires sealing off formations that are likely to pose a threat to the aquifer or human health (10 CSR 23-3.03(2)). This regulation will help restrict access and use of the contaminated shallow bedrock aquifer and provides additional protection of deeper units from the potential of cross-contamination by prohibiting wells installed through the contaminated zone. The Missouri Well Construction Code is enforceable on State owned property and may also be applied to any property transferred out of state or federal ownership. To provide additional protection, DA will pursue application of state law protections. Specifically, 10 CSR 23.3.100 allows more stringent well installation requirements for areas given a "sensitive area" designation. DA will request that the impacted areas of the WSOW site be designated as a "sensitive area". A sensitive area's well installation requirements and prohibitions may be enforced by the State of Missouri – Department of Natural Resources (MDNR). Further, the designation process allows the DA, DOE, and MDNR to develop specific requirements that can be tailored to site-specific conditions and contaminants. If schedules allow, the DA and DOE will pursue this application jointly for the WSOW.

**Deed Restrictive Covenant / Easements:** For the state owned property, the DA will coordinate with appropriate state agencies to implement in accordance with state law, a restrictive covenant or easement that would allow the State to impose, maintain, modify, terminate, and enforce groundwater use restrictions against any subsequent property owner(s) or user(s) or their contractors, tenants, lessees or other parties. This covenant or similar instrument will contain a legal description of the property, the location and description of residual contaminants, and state the groundwater use restrictions. Under state law, a restrictive covenant may be used as an IC at the WSOW. The State of Missouri is considering adopting the Uniform Environmental Covenants Act (UECA). If the State of Missouri does adopt the UECA in substantially similar form to the Model, the DA will seek implementation of a State UECA covenant on the MDC property.

In order to monitor the extent of groundwater contamination, several monitoring wells have been installed on State owned property. There are various means for acquiring continued access to these wells for the purpose of sampling and maintenance as part of the RA. An affirmative easement, or similar means for providing access, will be required to meet the performance monitoring objectives given the current extent of contamination and the current design.

The necessary covenant, easement, or similar instrument and agreement will describe both required and prohibited activities and will be appropriately recorded in order to run with the land in accordance with applicable State property and environmental law. Army Regulation 405-10 (Acquisition of Real Property Interests Therein) provides Army administrative requirements for the acquisition of an



easement, to include a determination that it is essential to current mission needs, which can not be feasibly accomplished by other mechanisms, and funding availability.

**Information:** The DA will coordinate with MDC and DOE with regard to development of information pamphlets or notices related to contamination issues on the recreational areas of the State owned property. The DA will also pursue use of space in the DOE Interpretative Center to convey similar information.

### **3.3 IMPLEMENTATION**

There will be use restrictions imposed through the restrictive covenant and well construction code process with the agreement of DA and the state. As previously stated, the full-scale implementation of ICs at the WSOW and WSTA will be executed over time. An estimated schedule for IC implementation is outlined in Section 4.

The procedures for establishing ICs for OU2 and enforcement of these controls will be integrated into a periodic status report of ICs. These reports will be provided to EPA and MDNR and will include an update on ICs implemented, ICs in continued development, and a projected schedule for any additional IC implementation previously proposed. The content of the status reports will be geared towards supporting the development of a comprehensive CERCLA 121(c) 5-year review for the WSOW OU2.

#### **3.3.1 Implementation Actions**

Until or unless the federal property of OU2 is transferred or leased, the DA or its representatives will be responsible for IC implementation, maintenance, inspection, reporting and enforcement. The DA shall address ICs within its control that are likely to impact remedy integrity and shall address issues consistent with the FFA and time frames described below. If periodic IC inspections and maintenance are required to address site-specific risks, the DA will be responsible for making the results available to the appropriate regulators.

As a condition of property transfer or lease, the DA will require the transferee or lessee, in cooperation with other stakeholders [MDC, DOE], to assume responsibility for various implementation actions as indicated below. Third party IC responsibility will be incorporated into pertinent contractual and property documentation, such as a purchase agreement, deed, lease, and RD addendum. Although the DA may transfer responsibility for various implementation actions to a third party, the DA shall retain its responsibility for remedy integrity. This means that DA is responsible for addressing violations of IC performance objectives that would impair the CERCLA remedy.

The DA shall perform the following implementation actions in accordance with the signed Federal Facilities Agreement (FFA) and ROD to ensure that the IC objectives are met:

#### **3.3.2 Installation Master Plan/ Operations**

Within 60 days of receiving EPA and MDNR approval of this RD, the DA will initiate development of an environmental overlay [GIS based] to be put into the installation master plan and the

administrative record consistent with AR 210-20. The overlay will initially consist of this document and a survey plat with the boundaries of the Site and locations of the land use controls. The DA shall also perform the following specific related actions:

- Send a copy of the IC RD to the following stakeholders with request for necessary action to implement ICs: Installation Public Works Director; MDC, and DOE.
- Prepare a map indicating the location and dimensions of OU2 and the extent of and groundwater contamination with IC location. (See figure 3-1)
- If state law permits, record a survey plat incorporating these IC objectives for the limited purpose of providing public notice of the environmental conditions and limitations on the use of property. This plat shall also be placed in the information repository for CERCLA actions. No property right or interest is intended to be nor shall be created by such notice. Further, the filing of the notice will not create independent enforcement authorities in the state or by third parties.
- Confirm that technical reviews will be conducted on all planned construction activities to prevent uses inconsistent with the IC objectives, adequate safety measures are used, and prior approval is obtained through the commanding officer and/or an installation planning board before site approval for construction or land use changes for the area subjected to ICs under this RD.

If additional IC related RD documents are needed, the DA shall likewise add those pertinent documents and survey plats to the comprehensive master plan and provide copies of the same to the stakeholders as well as update the previous copy of the plan placed in the Information Repository.

### **3.3.3 Monitoring/ Site Inspections**

A periodic site inspection will be conducted to confirm whether the required ICs remain effective and meet IC objectives for remedy protectiveness as stated in the OU2 ROD. Initially, this inspection will be conducted annually with changes in frequency to be coordinated with the regulatory agencies. The inspection results will be included in a separate report or as a section of another environmental report. The inspection will identify the status of ICs implemented, ICs in continued development, and a projected schedule for any additional implementation. The inspection will also discuss any IC objective violations, corrective action, IC effectiveness or needed changes, whether ICs are properly incorporated into deed and lease language, and any proposed changes to the installation master plan that would affect ICs. The DA (or its representative) will provide (via mail) each report to the EPA and the MDNR. For the state-owned property of the former WSOW, these site inspections may be performed by the state in coordination with the DA. Similar to other transferees, the state may also be considered responsible for notification to the DA of IC concerns and enforcement of use restrictions.

Upon conveyance or lease of the OU or a portion thereof, the DA may require, via deed, lease and/or transfer agreement, that transferees, lessees and their subsequent assignees perform similar or identical periodic site inspection reports to ensure that all IC objectives as stated in the OU2 ROD are met by all future users of the property.

### **3.3.4 CERCLA 121(c) Five-Year Reviews**

As part of the CERCLA Section 121(c) 5-Year remedy review process, the DA shall prepare a report certifying the continued effectiveness of the remedy, including effectiveness of the ICs. The periodic inspection reports will be used in the preparation of the Five Year Review and will include an assessment of the need to modify the ICs or their objectives. The DA will verify that the ICs for the OU2 continue to be properly recorded and/or maintained by the responsible agency or entity. Each remedy review will evaluate whether conditions have changed due to contaminant attenuation, migration or other factors such as land use. If the assessment indicates that risk levels have changed since initial IC implementation, IC modification will be considered, which will include a reduction in inspection frequency.

### **3.3.5 Modification of ICs and Land Use Changes**

Regulator concurrence shall be obtained with the terms outlined in the installation's FFA, if applicable (FFA Section X.C.2 [Consultation with EPA and MDNR]). The DA shall not, without EPA concurrence, make a modification to or terminate an IC, or make a land use change inconsistent with the OU2 ROD objectives. Likewise, DA shall seek prior EPA concurrence before commencing actions that may impact remedy integrity. In the case of an emergency action, the DA shall obtain prior EPA concurrence as appropriate to the exigencies of the situation.

### **3.3.6 IC Enforcement**

If DA, EPA or the state discovers any land use that causes a failure to meet an IC objective or that impairs the effectiveness of the OU2 remedy, that party will notify the others as soon as practicable but no later than 10 business days after discovery with a written description of the deficient land use. Within 10 business days after such notification, DA will provide EPA and the state information regarding what efforts or measures have or will be taken to address the deficient land use. The DA will work with EPA, the State, and if applicable, transferees/lessees of the property to take corrective measures. The DA is not precluded from taking immediate action pursuant to its CERCLA authorities to prevent any perceived risk(s) to human health or the environment. These measures may range from informal resolutions with the owner or violator, to the institution of judicial action under the auspices of State property law or CERCLA. Alternatively, should the circumstances warrant such, the DA could choose to exercise its response authorities under CERCLA then seek cost recovery after the fact from the person(s) or entity(ies) who violated an IC. Should the DA become aware that any future owner or user of the property has not complied with any IC requirement over which a local agency or the state may have independent jurisdiction, the DA will notify these agencies of such violation(s) and work cooperatively with them to re-achieve owner/user compliance with the ICs. Any violations that breach federal, state or local criminal or civil law will be reported to the appropriate civil authorities.

### **3.3.7 Termination of ICs**

ICs will remain until ARARs or health based remediation goals are met (Table 1-1 of this *Work Plan*; Table 2-8-1 of the ROD) which is considered to be unrestricted use of groundwater at this site. At such time that the DA and EPA agree that this has been achieved for the site (or portions thereof), ICs will be terminated as needed. The decision to terminate ICs will be documented consistent with the

National Oil and Hazardous Substances Pollution Contingency Plan (NCP) process for post-ROD changes, including potentially an explanation of significant differences or a RA Completion Report. If the property has been transferred and a determination by the DA and EPA has been made to terminate one or more of the ICs at OU2, the DA shall provide to the owner of the property an appropriate release for recordation with the deed pertaining to the site and will also timely advise other local stakeholders of the action. Regulator concurrence shall be obtained with the terms outlined in the installation's FFA, if applicable.

### **3.3.8 Leases and Property Transfers**

At the earliest possible time, but no later than 60 days prior to leasing or transferring any portion of the DA-owned property that exhibits impacted groundwater to another agency, person, or entity, [including federal to federal transfers], the DA shall provide notice to EPA and MDNR of such intended lease or transfer. The notice shall describe any additional mechanism(s) and parties to be used for future IC responsibilities after lease or transfer.<sup>1</sup> In addition, concurrent with the lease or transfer of property from the DA, information regarding the environmental use restrictions and controls will be communicated in writing to the recipients, adjacent property owners and to appropriate state and local agencies to ensure such agencies can factor such conditions into their oversight and decision-making activities regarding the property. Should a problem with IC implementation, maintenance, monitoring, reporting or enforcement arise at a transferred or leased property, the DA will work together with the transferee or lessee, and subsequent property owner(s) and user(s), as well as EPA, State regulators and appropriate local government representatives, to resolve any IC problems and to ensure expedient solutions.

### **3.3.9 Responsibilities of Subsequent owners/ lessees for IC Implementation**

In the event of property transfer or lease, the DA may require the transferee or lessee and subsequent property owner(s) and user(s) to assume certain responsibilities for IC implementation actions described above, including maintenance, inspection, reporting and enforcement, with the involvement of the appropriate regulators and/or local government representatives. The terms of responsibilities assumed by transferee(s) and subsequent owner(s) and user(s) shall be clearly documented in the appropriate transfer/ lease documentation. The DA will continue to: (1) conduct all CERCLA 121(c) reviews; (2) notify the appropriate regulators and/or local government representatives of any known IC deficiencies or violations; (3) reserve the right to access the property to conduct any necessary response; (4) reserve the authority to change, modify or terminate ICs and any related deed or lease provisions; and, (5) remain responsible for remedy integrity. To the extent permitted by law, a transfer deed shall require the ICs imposed as part of a CERCLA remedy to run with the land and bind all property owners and users to enforcement by DA, EPA and the state.

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<sup>1</sup> IAW current DOD and DA policy, a Finding of Suitability to Transfer (FOST) that describes the ICs and includes the land use restriction language, for subsequent use in the deed or lease, will be provided to EPA, the state and the public for their review and comment on the specific wording for property transfer, sale, or lease documents. The FOST also serves as the basis for deed inclusion of the CERCLA 120(h)(3) notice, covenant and reservation of access.

**3.3.10 Notification by the Transferee or Lessee**

The transferee or lessee, as well as subsequent property owner(s) and user(s), will be responsible for promptly notifying the DA and the appropriate regulators and/or local government representatives, of any deficiencies or violations of ICs and to correct the problem within a reasonable time. Any violations that breach federal, state or local criminal or civil law will be reported to the appropriate civil authorities. If the transferee/ lessee wants to (1) conduct additional remediation; (2) change land use inconsistent with a deed or lease restriction; or (3) modify or terminate an IC; the transferee/lessee must first obtain written concurrence from the DA and the appropriate regulator(s).

#### 4.0 PROJECT SCHEDULE

The milestones associated with the implementation of this *Work Plan (includes Phase I and Phase II)* are as follows:

Initiated coordination with affected landowners	February 2005
Meeting with GSRAD regarding Special Use Area	July 18, 2005
Initiated MNA monitoring (Round RA-001)	August 1, 2005
Initial face to face meeting with Missouri Department of Conservation (MDC) to discuss Institutional Controls	August 23, 2005

This represents an estimated general schedule for remedy implementation. A schedule consistent with the FFA will be provided following approval of the Phase 2 RD/RA Work Plan.

##### Anticipated/Target Milestones:

Initiate implementation of Institutional Controls	August 2005
Submit 1 <sup>st</sup> Quality Control Summary Report	October 2005
Submit “special area” designation package to Missouri Well Installers Board	November 2005
Submit 1 <sup>st</sup> Monitoring Report (Draft)	February 2006
MDC publish informational brochure	December 2006*
MNA monitoring (Round RA-002)	May 2006
Update and extend schedule (included as part of Monitoring Report)	July 2006
Monitoring Report to include recommendations for updating Work Plan revision (including development of checklists for Institutional Control inspections)	
MDC covenant/agreements in place	October 2006*
Special Area designation in place	May 2007*
Five Year Review for OU-1 & OU-2	March 2010
Submit Remedial Action Report	August 2165*

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\* These estimated dates are based upon anticipated execution of actions that are not within Army’s control.